his subject; the explanation of the principles and methods involved in the determination of the sun's distance by means of Transits of Venus, for example, is particularly meagre and unsatisfactory. The public that does not care to have to exert much thought over its reading is not the public that will purchase books on astronomy 550 pages in length; an occasional light article in a magazine will satisfy its utmost craving.

Nevertheless a book which in a lucid and easy style supplies accurate and the latest information as to the methods and discoveries of astronomy, which is written by a competent authority, and which, if not profusely illustrated, is supplied with plates and woodcuts which leave no important object unrepresented, no fundamental argument unsupported, can only be spoken of as a good one; and those who wish to possess a full, interesting, and popular account of the present state of the most noble and enthralling of all the sciences cannot do better than make themselves possessors of the "Story of the Heavens."

OUR BOOK SHELF

Annual Report of the Board of Regents of the Smithsonian Institution for the Year 1883. (Washington: Government Printing Office, 1885.)

THIS is the most bulky, and perhaps the most valuable, of these well-known Reports; it consists of very nearly 1000 pages, and we learn, from the resolution of Congress which precedes it, that 16,060 copies have been printed. The more strictly official part of it deals with the Smithsonian Institution and the Natural History Museum, including the Report of the Committee on the Henry statue recently erected in the grounds; but, besides these, we have Reports on the various branches of science, so valuable that no scientific library should be without them. Astronomy has been taken in hand by Prof. Holden, the newly-appointed Director of the Lick Observatory; meteorology, by Mr. Cleveland Abbe; physics, by Prof. Barker; zoology, by Prof. Guild; and anthropology by Mr. Otis T. Mason, the latter covering nearly 200 pages. Other branches of science besides those which we have named are reported at less length.

When we consider the importance of these *résumés*, and the fact that 7000 copies of the volume are being distributed gratuitously by the Institution all over the world, we may readily concede that in this, as in their other duties, the Regents of the Institution are faithful to the trust imposed upon them by Smithson to promote the increase and diffusion of knowledge among men.

The Sun: a Familiar Description of His Phenomena. By the Rev. Thomas William Webb, M.A., F.R.A.S. (London: Longmans, 1885.)

THIS is a little book of seventy-eight pages, containing what appears to have been a lecture given by the author, who, to the great loss of observational astronomy, died a short time ago. That part of it which deals with the telescopic facts is very much more in harmony with our present knowledge than that smaller part of it which deals with the revelations of the spectroscope. The whole is very charmingly and simply written.

Notes on the Physiological Laboratory of the University of Pennsylvania. By N. A. Randolph, M.D., and S. G. Dixon. (Philadelphia, 1885.)

THIS little volume consists of a series of short papers giving the results of practical investigations into the behaviour of certain substances, such as starch, cod-liver oil, boiled and unboiled milk, &c., when used as articles of food by infants and adults. Many of the papers are of interest; all of them show evidence that in the University of Philadelphia, physiology is not taught as a matter of book-learning, but that the students are instructed in the practical bearings of the science.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

Lieutenant Greely on Ice

I HAVE read with deep interest the graphic but brief account of Lieut. Greely's Arctic explorations given in NATURE of November 26 (p. 90), and also in some of the Scottish papers, which touch upon subjects not mentioned in NATURE.

Assuming that these reports are, in all material points, correct, I ask leave to be permitted to offer some remarks on a few of the opinions expressed by the distinguished explorer, the correctness of which seems open to question.

Before doing so, however, I would draw attention to the very considerable difference in the mean yearly temperatures at Discovery Bay, as given by the English Government ship that wintered there in 1875-76, and that of Lieut. Greely wintering at the same place six or seven years later.

Capt. Stephenson, H.M.S. *Discovery*, 1875-76 ...	−4°·23 F.
Lieut. Greely, in house six or seven years later, about	+4°·00
Making a difference of	8°·23

I suppose the thermometers to be in both cases correct, and the mean temperatures computed in the same manner in each case. In saying that "Grinnell Land has the lowest mean temperature in the globe," surely Lieut. Greely goes a little too far, as no observations have elsewhere been made in so high a latitude, nor at any point in the great circle of 1100 miles' diameter *nearer* to the Pole than Discovery Bay, in nearly all parts of which it would be a very natural conclusion to arrive at, that the mean temperature would be lower. Lieut. Greely adds, "This" (the lowest temperature in the globe) "was in accordance with their expectation."

Kane went to the Arctic Sea with "expectation" and a belief that he would find an open Polar sea! His steward, Morton, conveniently found it for him, and it was *believed* in for a time, until other expeditions passed the place where "Morton's pool" of open water had been seen; but alas! not a trace of it could be found, although ships had gone by, creeping along shore, some hundred miles further north. The distinguished Greenland explorer Rink, finally, effectually demolished this Arctic dream. Lieut. Greely's open Polar sea of 1100 miles' diameter round the Pole seems to be a myth of a somewhat similar kind. It is purely a theory, with facts, to my mind, adverse to its probability; for why this immense body of water in the far north, whilst constantly sending forth great ice-streams southward through the broad inter-Greenland-Spitzbergen Channel, should be itself ice-free, whilst other seas far southward, having a much higher temperature, and probably with currents and gales of wind at least as strong, are ice-encumbered, is rather difficult to understand.

As regards floebergs, Lieut. Greely has advanced their size and thickness far beyond anything one would infer from reading the narrations of the English Expedition of 1875-76, which first gave the name to those curious masses of ice. He has not only done this, but he attributes their formation to a source which completely destroys the meaning of the name "floeberg," used in contradistinction to "iceberg," to show that the former has its origin from the floe or sea ice, instead of from ice formed on land, and is either built up by the gradual increment of the floe and the snow that falls upon it, or, as I believe more likely, by a number of floes being forced by immense pressure one over the other, until great thickness is attained. Perhaps the best example of a floeberg (according to my idea) that I can give, is that which lifted the ship of the Austrian Expedition seventeen feet (I think) out of

the water, became a great floating mass of ice in a week or less, a mile in extent and of great thickness, and carried those good explorers Weyprecht and Peyer helplessly about for a long time in 1873-74, in Barentz Sea, then landed them safe on one of the Francis Joseph Islands; thus leading to the discovery of this great Northern land. Snowdrifts would in the course of one winter (I have seen a fifteen feet depth of drift in one night) fill up most of the inequalities of surface, and thus the floeberg is complete.

Lieut. Greely says that these "floebergs are simply detachments from slowly-moving glacial ice-caps, from an ice-covered land in the neighbourhood of the Pole;" that "Dr. Moss (of the *Alert*) was certainly correct as to the universality of stratification in this *ancient* ice, and he concurred in the Doctor's opinion, that its salinity was due to efflorescence and infiltration."[1]

First as to the formation of these floebergs; Lieut. Greely tells us they are detached from an ice-cap 1000 to 4000 feet thick near the Poles. Surely if this were so, some of these great masses, which would show about 140 feet above water, would have been seen by Parry, when in the summer of 1827 he was in lat. 82° 45′ N. (only thirty-nine miles south of Greely's extreme) to the north of Spitzbergen; but neither Parry nor any of the brave whaling captains, who have gone to high latitudes between Greenland and Spitzbergen—the great highway of northern ice in its southward drift—have ever seen anything of the kind.

In the Antarctic we all know that such ice-mountains (the source of which Sir James Ross's discoveries tell us of) drive down to lat. 60° S. near to Cape Horn; the natural idea is, that they would do the same thing in the Arctic Sea—in company with the great ice pack, through the wide high road above mentioned—and not confine themselves to the coast seen by Lieut. Greely's party.

A word or two on my own experience much further to the south.

When passing in my boats for 800 or 900 miles along the west shores of Hudson's Bay in 1846 and 1853, I saw several floebergs aground, some thirty or forty feet above the surface, so large and high that any one at a distance of a mile or so, would have mistaken them for true icebergs; they were merely a mass of floes forced together by strong winds. In such low latitudes (58° to 66°) these spurious icebergs all disappeared before autumn.

No true iceberg that breaks away from land-ice is ever found, as far as I know, to contain saline strata, as the late Dr. Moss found to be the case with the floeberg from which the crew of the *Alert* in 1875-76 took the ice, for drinking or making tea. Sometimes this ice was so salt as to be unfit for the purpose, although high above the sea-level. This result is attributed by both Dr. Moss and Lieut. Greely to "infiltration." I cannot understand how saline fluid could "infiltrate" *upwards* from the sea into ice—a solid—in which there would be no pores through which it could flow, apart from the fact of the greater specific gravity of the brine.

I do, however, know from personal experience that saline fluid does, under certain circumstances, percolate or filtrate *downwards*, converting sea-ice, previously saline, into a sufficiently fresh state to afford good drinking-water when thawed. This discovery, like a good many others of more importance, was accidental. In passing a piece of old ice—that is, of a former year's formation, which was known to be so by its wasted and rugged outline, as it stood some feet above the surrounding level ice-floe—I knocked a small piece off, and on putting it into my mouth, found it quite fresh. From that time, during sledge journeys of 1200 miles in the spring of 1847, I looked out for some old rough ice, before building our snow-hut for the night's shelter, so as to get water quickly.

Experience had taught me that a kettleful of water could be obtained much more rapidly and at a far less waste of fuel by thawing ice than from snow, because the latter, however closely packed, contained much air, which, at a temperature of zero or lower, required extra fuel to warm it *up* to 32° Fahrenheit; a kettleful of snow will give little more than a third of a kettleful of water, whilst the same measure of ice will nearly fill the kettle with water.

The fresh ice I speak of could not be part of an iceberg, because there were no bergs in the great bay where we were travelling. Moreover, if a piece of this ice (which was fresh at a few feet above the sea-line) was chopped off on a level with or below the water-line, it was found to be saline.

How does this take place? Simply, I imagine, by the brine or saline fluid filtrating downwards through pores made by itself in the ice, as soon as the summer temperature became high enough to thaw the saline part, the fresh portion retaining its solidity, with the exception of the minute pores worn out as above described.

My belief is that the floebergs seen, and so named by the English Expedition of 1875–76, were formed of saline sea-ice, piled one floe over another, and that when the summer temperature penetrated them to a certain extent, the salinity filtered downwards as above described, but that certain layers or strata, either from not being subjected to a sufficient rise of temperature or from some other cause, still retained their saltness.

All sea-ice has a surface-layer, more or less thick, of brine efflorescence, far more saline than the body of the floe. If, then, six or eight floes are forced up, the one over the other, there will be so many layers of these thin very saline strata.

I repeat that infiltration *upwards* in this case is contrary to all laws of gravitation, unless those learned in chemistry or physics can show that there is some powerful attraction or affinity to drag a saline fluid upwards through a dense solid.

This communication has gone far beyond the limits I intended, and yet is very short of what might be said on other parts of Lieut. Greely's lectures in Scotland. I must conclude by expressing my admiration of the great amount of geographical work done by this expedition, and the miraculous rescue of the few survivors where twenty-four hours' delay would have been fatal, resembling in this respect very closely the rescue of a *part* of a Government overland expedition in Arctic America sixty-four years years ago, who, but for the arrival of friendly Indians with food and most tender nursing of them, could not have lived more than a couple of days longer.

4, Addison Gardens, Kensington, Nov. 28 JOHN RAE

P.S.—The *Scottish Geographical Magazine* has just reached me, by which I find Greely's mean temperature of his winter quarters to be $-4°$ F. instead of $+4°$, therefore almost exactly the same as the temperature found by the English Expedition of 1875-76, instead of there being 8° difference—as I put it.—J. R.

December 7

[1] I met the late Dr. Moss at the British Association when held some years ago in Dublin. We conversed a good deal on the above subject. I learnt from him, if my memory is correct, that the floeberg from which the crew of the *Alert* took the ice to thaw for their use, was found to have strata too saline to drink. This explanation I think requisite.—J. RAE.

The Recent Star-Shower

IT being important to ascertain the duration of the recent shower of Andromedes, observations were continued here on the night of November 30. During a watch maintained for about four hours and a half between 5h. 30m. and 10h. 15m., ten Andromedes of most certain character, together with two other meteors, in reference to which some doubt existed as to their absolute identity with this stream, were recorded from a radiant-point carefully determined at $21° + 42\frac{1}{2}°$. Thirty-one non-conformable shooting-stars were also seen from showers in Perseus and the region eastward.

It is therefore clear, from the results obtained on November 30, that the display had not lost its visible character, though it had evidently subsided into a state of great feebleness. It yielded certainly not more than three meteors per hour for one observer, and these were extremely faint.

On the evening of December 1 the sky was again clear. A prolonged watch of the region of Andromeda then revealed no trace of the display. Meteors were very rare, generally, all the evening. On December 4 they were very frequent, but the radiant-point near γ Andromedæ gave no sign. The ζ Taurids and Geminids (which are specially mentioned in the current number of NATURE (p. 108) as deserving observation during the present week) were both visible, and a number of contemporary streams had come actively into play. But, during long watches on the nights of December 1 and 4, there was no appearance of outlying Andromedes. The cessation of the shower definitely occurred between November 30, 10h. 15m., and December 1, 5h. 45m., after an *observed* duration of little more than five days. But this period unquestionably fails to represent the real duration, for, could observations have been made before moonrise on the early evenings of November 24 and 25, there is no doubt it would have been detected. We can hardly admit a sudden rise of the shower from invisibility on the 25th to a degree of richness on the 26th sufficient to give more than 100 meteors per hour. It is to be hoped that reports from other stations will throw some light on the visible development of this remarkable stream. In any case the extremely narrow limits of its display